SATELLITE COMMUNICATIONS

(Motor Carrier Safety Law Enforcement Options)

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Broadband satellite data communications has long been seen as a potential solution to enhancing data communication in law enforcement. Until now costs have been beyond the reach of routine use in this area, but that is changing. Unfortunately, however, tracking the satellite communications industry is a challenge because the hype frequently exceeds the reality and major systems are constantly being cancelled or redesigned.

The market for broadband networking is steadily growing and communication companies realize it. Several new services are being offered which could bring costs and performance into balance.

The most exciting developments are in two areas.

- Low Earth Orbit (LEO) satellite constellations designed for voice services with handsets and omni-directional antennas. These include **GlobalStar** and **Iridium Satellite Networks,** which are steadily moving into packet data communications.

- Geostationary Earth Orbit (GEO) satellite constellations now being tasked to provide two-way Internet service to the consumer market. This approach requires 24-36" fixed dish antennas, but offers near broadband data transfer rates. These include the **DirecPC** system operated by Hughes Network Services and the **StarBand Communications** system, which involves Gilat Satellite Networks, EchoStar Communications and Microsoft.

At present other services are too expensive, require too much ground station equipment, or only exist on paper.

Motor carrier safety law enforcement needs are in two areas. Ideally the best satellite communications system would only require very portable transceivers and no antenna alignment. This would be a universal solution for both police cruiser and fixed site locations. A possible alternative for fixed site roadside Ports-of-Entry applications is a fixed dish antenna system with very low cost transceiver. Both systems require secure IP packet communications used as a Virtual Private Network (VPN). Various law enforcement services such as SAFER, CDLIS, NLETS, NCIC, etc, can be linked with this technology.

LEO Solutions

Iridium Satellite Inc. www.iridium.com

This is the successor of the original Iridium Satellite system. The new company purchased the assets of the bankrupt Iridium at a very low cost and is able to offer services at better pricing and still make a profit. Iridium Satellite is only marketing into vertical markets such as government. They have also introduced improved transceiver handsets (smaller & lighter). The new company started operations in the first quarter of 2001 with a focus on voice communications. It will introduce enhanced data communications in the third quarter of 2001.

SATELLITE CONSTALLATION & COVERAGE: Global coverage is provided by 66 LEO satellites. Seven additional satellites will be launched in 2001-2002. Boeing operates the satellite network.

SERVICES: voice and limited packet data services. Vodacom operates the gateway services to connect through the system.

BUSINESS PLAN: Marketing is focused on voice services to remote locations in vertical markets, specifically Government and Energy. Iridium has a two-year contract to provide handset voice service to 20,000 Department of Defense workers. The company currently has over 7,000 customers and can reach breakeven with 63,000 customers. The old Iridium served about 60,000 customers.

DATA TRANSMISSION RATES: Currently data transmission is limited to 2.4 kbps, but that will be expanded to 10 kbps by 2002

COSTS: Voice services are $1 to $1.50 per minute. Handsets cost $1,500 and volume discounts are offered.

DATA PROTOCAL: Pure IP to access the Internet through an ISP.

MOTOR CARRIER SAFETY CONTACTS: APL is conducting a beta test of the service using IPsec to ensure security.

GobalStar www.globalstar.com

This is a partnership between Qualcomm, Loral, who own the satellites, and Vodacom who owns the Gateways in the US. This system uses a network of low earth orbit satellites that can be accessed from handsets or car/truck mounted antenna.

SATELLITE CONSTALLATION & COVERAGE: 48-LEO satellites cover all of North and South America, Europe, Australia. Africa and parts of Asia are not covered.

SERVICES: Voice, Packet Data (CDPD), Dial-up data. GlobalStar also sells access to its systems to other telecom service providers.

BUSINESS PLAN: GlobalStar is focused on voice communication services and offers a multi-mode phone that can switch between cellular and satellite services.

COSTS: Similar to Iridium

DATA PROTOCAL: Uses IP. AT&T provides the CDPD services that are setup through the satellite gateway in Clifton, Texas. A PPP session is established between the user and the gateway so links can then be routed via VPN in the Internet. Obviously a dedicated network could also be established at additional cost. The system assigns dynamic IP addresses out of a pool of private addresses. Any requirement for using fixed IP addresses to authenticate could be a problem.

PERFORMANCE: Packet setup of the PPP session requires about 6 seconds. Transmitting a single ASPEN file (4k bytes) would require about 10 seconds.

MOTOR CARRIER SAFETY CONTACTS: APL has successfully created a VPN with IPsec encryption over the GlobalStar network. All SAFER applications were accessible using this configuration. Oklahoma DPS is talking to GlobalStar about using them for Motor Carrier Safety queries, messaging, and data transfers (such as from ASPEN inspections).

GEO SOLUTIONS

DirecPC Services (Hughes Network Systems) www.direcPC.com

This consumer service is an upgrade from the one-way DirecTV satellite data service where the uplink was via dial-up modem. Hughes is partnered with American Online, Earthlink, Juno, and Pegasus to offer this as an Internet access service. The two-way service started in the 4th quarter of 2000.

The service requires 24-36” fixed dish antenna aimed at a GEO satellite. Hardware can be a data only transceiver & satellite modem or a data and TV system called “DirectDuo”. The equipment is 4th generation based on Hughes 15 years experience in two-way satellite systems.

SATELLITE CONSTELLATION & COVERAGE: Several geostationary satellites from the Hughes constellation.

SERVICES: Internet data

BUSINESS PLAN: This is a mass consumer/small business service designed to provide millions of customers with broadband Internet service that competes with DSI and Cable.

COSTS & EQUIPMENT: Unlimited always-on service is $50/month with ISP services. Dish, transceiver, installation and satellite modem are extra (approximately $600). The satellite modem may be either USB external or PCI internal.

DATA PROTOCAL: TCP/IP, always-on

PERFORMANCE: Downstream: 400 kbps; Upstream: 128 kbps

MOTOR CARRIER SAFETY CONTACTS: none

StarBand Communications **www.starband.com**

StarBand is a joint venture of:

(1) Gilat Satellite Networks, an Israeli satellite marker,
(2) EchoStar Communicaitons, which owns and operates the dish Network television Service
(3) Microsoft which invested $50 M in the venture.
(4) ING Furman Selz Investments

StarBand introduced two-way Internet service in November 2000 for nationwide use. It is marketing through Radio Shack Stores and the EchoStar Dish Network.

SATELLITE CONSTELLATION & COVERAGE: Two geostationary satellites.

SERVICES: Internet data

BUSINESS PLAN: This is a mass consumer/small business service designed to provide millions of customers with broadband Internet service that competes with DSI and Cable. GEO distances (22,300 miles above earth) add considerable delays that reduce the usefulness of this service for Internet Telephony or interactive applications. These delays do not effect file transfers and most web surfing.

COSTS & EQUIPMENT: Unlimited always-on service is $70/month with ISP services. The dish and transceiver cost $400 and installation cost $200. The StarBand antenna can also accommodate satellite TV from the EchoStar DISH network.

DATA PROTOCAL: always-on TCP/IP

PERFORMANCE: Transfer rates depend on traffic load. Downstream: ranges from 150 to 900 kbps (500 average), Upstream: 40 - 128 kbps

MOTOR CARRIER SAFETY CONTACTS: none

ISSUES:

SECURITY – This is the big issue. Some authentication strategies require fixed IP addresses which are not readily available from these systems. They mostly use dynamic IP addresses. The vendors contend, however, that fixed IP security can be spoofed as well, so it is not foolproof. IPsec & VPNs is one solution that APL is testing with success. Note that use of VPNs has been approved for AAMVA & NCIC links.

RESPONSE TIME – This could be an issue for some applications. No serious testing has been done on Motor Carrier Safety Systems.

COMMITMENT – All of these services are targeted to either voice traffic or consumer Internet access. These companies have limited interest in commercial data traffic and probably will no modify their services to accommodate specific law enforcement needs.

FUTURE:

In general future plans are heavily hyped by the promoters. Grand plans are constantly being made and then unraveling. The next generation could be the ambitious **Teledesic network** (funded by Bill Gates, Motorola, and Craig McCaw). Teledesic is shooting for broadband speeds of up to 5 Mbps downstream and 1 Mbps upstream. Repeated delays have pushed startup back to 2004. Another startup**, WildBlue** (formerly iSky) is looking to launch in 2002 with a 3 Mbps data service.

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